(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0209 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2010-11

ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Time : 3 Hours *Total Marks : 100*

Note : (1) Attempt **all** questions.

(2) All questions carry equal marks.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) Differentiate between electrical, electronics and mechanical instruments with suitable examples.

(b) What is standard ? Explain different types of standards.

(c) A resistance is measured by the voltmeter-ammeter method. The voltmeter reading is 123.4 V on the 250 V scale and the ammeter reading is 283.5 mA on the 500mA scale. Both meters are guaranteed to be accurate within ±1% of full scale reading. Calculate indicated value of resistance and limits within which the result can be guaranteed.

(d) A dc circuit can be represented by an internal voltage source of 50V with an output resistance of 100 k Ω. In

order to achieve accuracy better than 99% for voltage measurment across its terminals, calculate the resistance of voltage measuring device.

(e) The meter constant of a 230V, 20A single-phase energy meter is 1800 rev/KWh. The meter makes 200 revolutions in 120 seconds when tested at full load at 0.8 pf lag at the rated voltage. Determine the error in energy meter reading.

(f) A three phase, 400V load has power factor of 0.6 lagging. The two wattmeters read a total power of 20 KW. Find the reading of each wattmeter.

2. Attempt any two parts of the following : **(10×2=20)**

(a) Describe the constructional details and working of 3-phase electrodynamic power factor meter. Describe why phase splitting is not necessary in this case.

(b) What are the different methods of measurement of speed ? Explain the construction and working principle of any one of them.

(c) Enlist the difference between power transformer and instrument transfarmer.

A current transformer with 5 primary turns has a secondary burden consisting of a resistance of 0.16 Ω and an inductive reactance of 0.12 Ω, when the primary current is 200 A, the magnetizing current is 1.5A and the iron loss current is 0.4A. Find the number of secondary turns needed to make the current ratio 100:1 and the phase angle.

Attempt any two parts of the following : (10×2=20)

(a) Describe the working of Anderson's bridge for the measurement of inductance. Derive the equations for balance conditions and draw the phasor diagram under balance conditions.

(b) Describe the working principle of Q-meter with suitable circuit diagram.

The self capacitance of a coil is to be measured by Q-meter. The first measurement result is f_1=1.5 MHz and C_1=550 pf. The second measurement result is f_2=3 MHz and new value of tuning capacitor is 110 pf. Find the distributed capacitance and inductance of the coil.

(c) What is three-terminal resistance ? Explain its use. What are the difficulties in measurement of high resistance ? Explain the use of guard circuits.

Attempt any two parts of the following : (10×2=20)

(a) Describe the construction and working of a co-ordinate type ac potentiometer. How is it standardized ? Explain how an unknown voltage can be measured with it.

(b) Explain ac Wattmeter method for determination of iron loss of test specimen of iron piece.

(c) A flux meter is connected to a search coil of 100 turns and the mean area of the coil is 5 cm^2. The search coil is placed at the centre and a standard solenoid 1.m long uniformly wound with 800 turns. When a current of 5A is reversed, a

deflection of 10 scale divisions is obtained with the fluxmeter. Calculate the calibration constant of the instrument in Wb-turns per division.

5. Attempt any three parts of the following : $(6\frac{2}{3} \times 3 = 20)$

(a) Describe the construction and working of dual trace CRO with suitable block diagram.

(b) Draw and explain the circuit of a ramp type digital voltmeter.

(c) Explain the functioning of a time-base generator in a CRO.

(d) Describe the construction and working of wave analyzers used for audio frequency and megahertz ranges.

(e) Explain briefly with the help of neat diagrams the use of electronic multimeter.